LINK MULTI-FONT OPTICAL READER

Link's efforts in this field date back more than a decade, at which time some pioneering work was carried out under the direction of Mr. Harold Hemstreet, a former director of the Binghamton Laboratory. This early work established the ground work for the present program.

One particular laboratory model print reading machine with a vocabulary of ten numerical digits is still used for research and study purposes. This is an Optical Reader employing a photo-diode matrix. The logical design of the machine is such that an increase in reading vocabulary is merely a matter of increasing memory capacity and scanning resolution which can be readily accomplished.

Link Division's capability in Multi-font Character Recognition equipment has been upheld by an Air Force Contract (RADC AF 30 (602) 2642) award to Link for a Multi-font Study Program. Link was awarded this competitive contract in competition with the major Character Recognition and Data Processing primes in the industry. Not only was Link's technique judged superior, but an operational engineering model multi-font reading machine was judged by the proposal evaluation board to have uniquely extended the state-of-the-art. Work has been going forward at Link for some time on this Air Force program and this information added to Link's intensive company sponsored development, will place Link increasingly in the forefront in the Character Recognition field.

An additional boost to put Link even further ahead in this field was the recent winning of a Multi-font Page Reader Contract from a large loan company. This contract requires the handling of various weight and size documents with the ability of reading four different font styles simultaneously. To the best of our knowledge, this will be the only commercial multi-font reader in the world.

Some outstanding characteristics of our Laboratory breadboard are as follows:

1. Complete independence of character horizontal registration and with vertical registration limited only to within the limits of the scanning raster. (approximately $\pm \frac{1}{2}$ a character height).

2. Reading rate variable up to 500 characters per second. A machine reading at the rate of 500 characters per second is now in operation at the Link Binghamton Laboratory. The characters are read out by an electronic character generator, a Link developed device called "Dotitron" the output of which is presented on a CRT in alpha-numeric form. This upper limit of 500 characters per second is at present determined by the document transport. The actual limit of the recognition logic is probably nearer 1000 characters per second. A line reading

rate more readily used when handling pages is 3 1/3 lines per second. This average line rate included document load time, scanning from line to line time, and document unload time.

3. Tolerance for minor variations in type style such as the presence or absence of serifs.

4. Interchangeable static memory units to accommodate major changes in type style or vocabulary.

5. Compatibility with magnetic drum storage for extremely large vocabulary applications.

6. Logical design is completely independent of symbology stroke characteristics. That is, characters of any shape can be automatically recognized after being appropriately coded and stored in the machine memory.

7. It is based on a digital recognition technique as opposed to the other most popular trend in Optical Readers, that of using various mask techniques.

8. The coded output can be utilized to transfer the scanned intelligence to magnetic or paper tape or computer type cards.

9. Positive or negative image recognition capability with only minor changes in internal connections. Therefore, either original documents or photographic negatives of these documents can be used as the machine input.

10. Advanced semiconductor circuits are used throughout including a large number of recently developed four-layer switching devices.

11. No special inking characteristics are required. The impressions obtained from manual typewriters are acceptable as long as reasonably clear and dark impressions are obtained.

12. It has the handling capabilities of:

    a. handling various sizes and weights of paper documents continuously without double feeding and without extensive adjustment for the various weights and conditions of papers it is required to read.

    b. handling computer type cards in wrinkled or partly torn condition with confidence.

    c. turning the documents over to be able to read the intelligence on both sides. (This problem is presently being studied).

The Link Division of General Precision, Inc. is well known in the field of Electro-Optical Systems and is making significant contributions in the fields of Interferometric Metering Techniques and Photogrammetry. This background and experience is readily applicable in the area of Optical Character Recognition.

GENERAL PRECISION RECEIVES ORDER FROM BENEFICIAL FINANCE FOR NEW OPTICAL CHARACTER READER THAT CAN READ MORE THAN ONE TYPE-STYLE

Binghamton, New York, July 31, 1962;   General Precision, Inc.'s Link Division announced the receipt of an order from Beneficial Management Corporation, Morristown, New Jersey, a subsidiary of Beneficial Finance Co., for a new optical character reader with a capability of reading more than one type-style.

The reader, the first of its kind, stores information on magnetic tape to be fed into the company's computer to automate and facilitate handling of the load of paperwork connected with updating customers' accounts and recording new ones.

According to Link Division, which developed the Multifont Optical Character Reader, the Beneficial unit will be able to read four different type-styles with no changes necessary in the machine. It will scan and convert information from printed or typed forms at 500 characters or 3.3 lines per second, reading characters that have been prepared on typewriters, posting machines, high-speed printers or other hard-copy printers.

-more-

Papers of various sizes and weights can be fed into the machine for pro-
cessing. The system is not significantly affected by tears, wrinkles, dog-
eared pages, folds or even staples, and the presence or absence of serifs
(fine lines at the top or bottom of a letter) do not adversely affect the read-
ing capability of the machine.

Beneficial Finance also has an option for a second machine to be used
similarly with data processing for the 1,360 Beneficial Finance offices in
the United States, Canada, England and Australia. Beneficial is the largest
organization of its kind in the world serving nearly two million families a
year.

General Precision, Inc. is the principal operating subsidiary of General
Precision Equipment Corporation, Tarrytown, New York, a leading pro-
ducer of electronic systems and components, guidance and control equipment,
computers and data processors for the military and industry.

# # #

August 15, 1962

Tad Nelson, Rsch. Asst.
Lab of Social Relations
Harvard University
Cambridge 38, Massachusetts

Subject: Multi-font Optical Character Recognition
                    and Reading Equipment

Dear Sir:

In response to your requesting information on Link's General
Character Recognition Program, I would like to point out
that we have built a numeric reading system which is cur-
rently operating on a daily basis at a speed of some six
hundred characters per second. We have presently extended
the capability of this machine to read the more difficult
alphabetic characters. These modifications now allow read-
ing a line of characters in which the characters could
differ by plus or minus one-half a character height in ver-
tical registration.

This newly revised machine is now in operation and I would
like to extend to you an invitation to visit the Link Bing-
hamton Laboratory at your convenience, to observe some of
this equipment. Further, Link would be pleased to discuss
the possibility of bidding on any requirements which you
may have for Optical Character Readers and Peripheral Equip-
ment. I have included as an attachment to this letter a
general description of our equipment.

I would be pleased to give you and your staff a technical
presentation, at your convenience, on Link's Multi-font
Optical Reader. If, during the interim, any additional in-
formation is necessary you may call me at Area Code 607,
RA 3-9311 ext. 492, and we would be pleased to furnish any
further information in an expeditious manner.

Very truly yours,

Gary J. Dotzler
Advanced Products
Sales Representative

GJD/bjk
Attachments

DEPLOYMENT LISTING

Andrews AFB, Maryland

Atlantic City, New Jersey - FAA-NAFEC

Barnes AFB, Massachusetts

MCAS Beaufort, North Carolina

Bradley AFB, Connecticut

Cecil Field, Florida

MCAS Cherry Point, North Carolina

Craig AFB, Alabama

Danbury, Connecticut

Dannelly Fld, Alabama

Detroit, Michigan

Dow AFB, Maine

Florida ANG, Florida

NAS Floyd Bennett, New York

Homestead AFB, Florida

Hunter AFB, Georgia

Imeson, Florida

NAS Jacksonville, Florida

Key Field, Mississippi

NAS Lakehurst, New Jersey

Langley AFB, Virginia

Long Island, New York

Loring AFB, Maine

Martin Field, Maryland

McGuire AFB, New Jersey

NSD Mechanicsburg, Pennsylvania

NAS Meridan, Mississippi

Miami, Florida	Dyess AFB, Texas
Moody AFB, Georgia	Forbes AFB, Kansas
Niagara Falls ANG, New York	Forth Worth, Texas
Norfolk, Virginia	NAS Glenview, Illinois
NAS Pensacola, Florida	Hector Field, North Dakota
Pease AFB, New Hampshire	James Connally AFB, Texas
Pennsylvania ANG, Pennsylvania	Kelly ANG, Texas
Philadelphia, Pennsylvania	Kincheloe AFB, Michigan
Plattsburgh AFB, New York	NAS Kingsville, Texas
Richmond ANG, Virginia	Laredo AFB, Texas
Rochester, New York	Lincoln AFB, Nebraska
NAS Sanford, Florida	McConnell AFB, Kansas
Seymour-Johnson AFB, N. C.	Minneapolis, Minnesota
Tyndall AFB, Florida	Minot AFB, North Dakota
Vermont ANG	NAS Olathe, Kansas
Washington, D. C.	Perrin AFB, Texas
Westchester County, N. Y.	Randolph AFB, Texas
Westover AFB, Massachusetts	Reese AFB, Texas
NAS Willow Grove, Pennsylvania	Richards-Gebaur AFB, Missouri
Wright-Patterson AFB, Ohio	Schilling AFB, Kansas
Bunker Hill AFB, Indiana	Headquarters 2ND Air Force (SAC)
Carswell AFB, Texas	Selfridge AFB, Michigan
Capitol Airport, Illinois	Toledo Airport, Ohio
NAS Chase Field, Texas	Truax AFB, Wisconsin
NAS Corpus Christi, Texas	Vance AFB, Oklahoma
Dallas, Texas	Webb AFB, Texas
Duluth ANG, Minnesota	Whiteman AFB, Missouri

NAS Alameda, California

Castle AFB, California

Cupertino, California

Davis Monthan AFB, Arizona

Denver, Colorado

MCAS El Toro, California

Headquarters 15th Air Force (SAC)
Riverside, California

Geiger AFB, Washington

George AFB, California

Kansas City, Missouri

NAS Los Alamitos, California

McChord AFB, Washington

NAS Miramar, California

NAS Moffett Field, California

Montana ANG, Montana

Mountain Home, Idaho

NAS North Island, California

Paine AFB, Washington

Portland AFB, Oregon

NAS Seattle, Washington

Spokane International Airport

Travis AFB, California

Washington ANG

Williams AFB, Arizona

Elmendorf AFB, Alaska

Hawaii ANG

MCAS Kaneohe, Hawaii

Amsterdam, Holland

Aviano AB, Italy

Bonn AB, Germany

Bentwaters, RAF, England

Bitburg AB, Germany

Camp New Amsterdam, Holland

Elevsis AB, Greece

Hahn AB, Germany

Herbern AB, Germany

Koterberg, Germany

Lakenheath, England

Landshut, Germany

Middlesex, England

Moron AB, Spain

Nea Ankihilas, Greece

Brize-Norton, England

Ramstein AB, Germany

Rome, Italy

Stockholm Sweden

Torrejon AB, Spain

Weisbaden, Germany

Zaragossa AB, Spain

Don Muang, AB, Thailand

MAAG Formosa

Itazuke AB, Japan

Misawa AB, Japan

Osan Ab, Korea

Tokyo, Japan

Yakota AB, Japan

Anderson AB, Guam

Clark AFB, Philippines

Naha AB, Okinawa

MAAG Colombia, South America

MAAG Ethiopia

Sydney, Australia

Goose Bay AB, Labrador

MAAG Canal Zone, Puerto Rico

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